9. Modulation Effects

Objectives

- Discuss how **modulation is created and historical methods** of doing so
- Identify the **function of an LFO**
- Identify **specific modulation effects** and what they **do to the sound**
- Discuss the **effect of LFOs** on a wave

Skills Development

- Logical Thinking

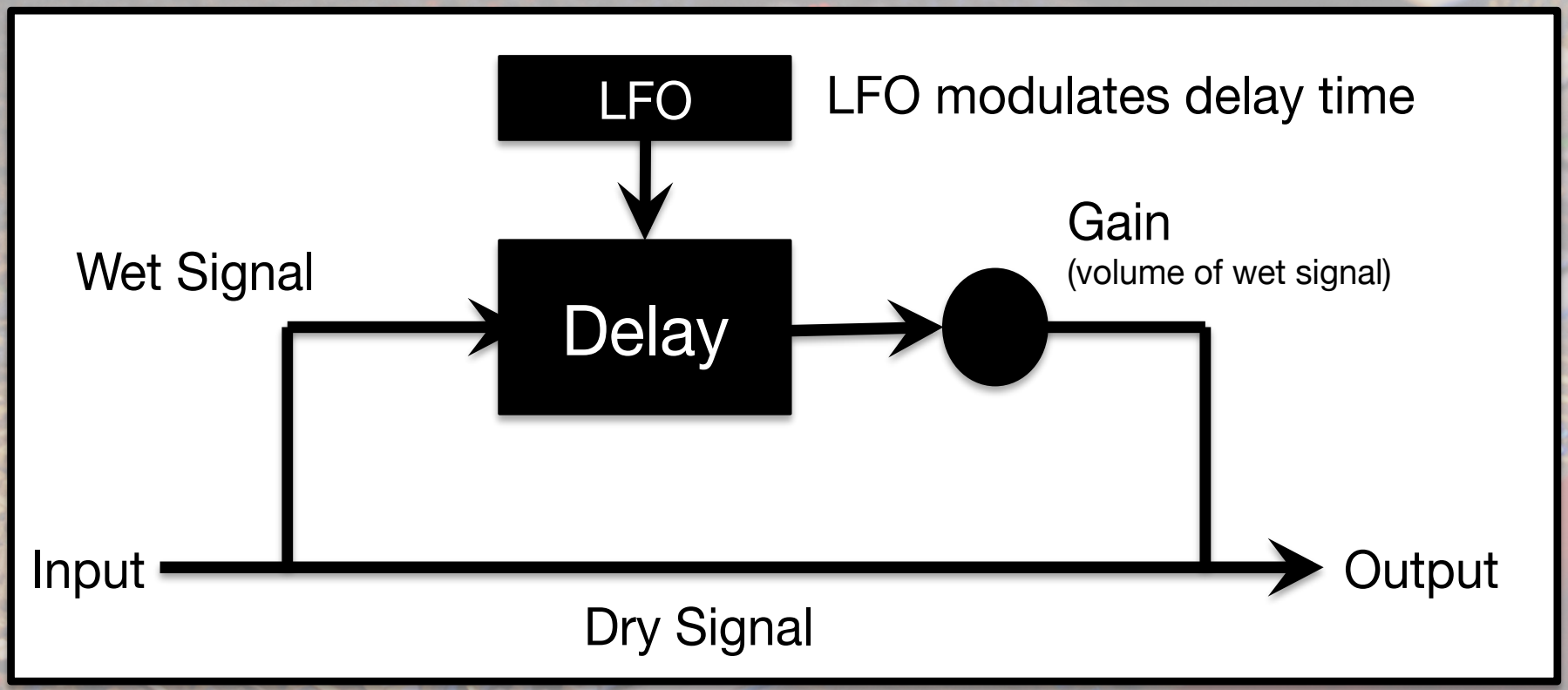
Key Words

Modulation
Chorus
Flanger
Phaser
Vibrato
Tremolo
Rate
Depth
LFO
Leslie Speaker
Crossover
All Pass Filter
Wet Signal
Dry Signal

What is Modulation?

- **Modulation effects** involve making a parameter alter automatically over time
- **LFOs (low frequency oscillators)** are often used in order to do this
- Most modulation effects involve the combination of a **wet** and **dry** signal

What is Modulation?



9. Modulation Effects

Effect	Sound	How is it produced?	Examples
Chorus	'Shimmer'	Modulation of pitch and delay time to produce a layered effect ('chorus of voices'). Dry/wet.	Smiths – This Charming Man Nirvana – Come As You Are Crowded House – Don't Dream It's Over
Flanger	'Sweeping'	Modulation of delay time with feedback to produce a 'jet-plane' effect with movement. Dry/wet.	Heart – Barracuda Small Faces – Itchycoo Park Lenny Kravitz – Are You Gonna Go…
Phaser	'Movement / Plane'	Use of all pass filter to modulate the phase/delay depending on the frequency ('non-linear'). Dry/wet.	Sex Pistols – Anarchy in the UK Billy Joel – Just The Way You Are Radiohead – Paranoid Android
Vibrato	'Wobble of Pitch'	Modulation of pitch with no wet signal.	Percy Sledge – When A Man
Tremolo	'Wobble of Volume'	Modulation of volume with no wet signal.	Nancy Sinatra – Bang Bang REM – Crush with Eyeliner Radiohead - Bones

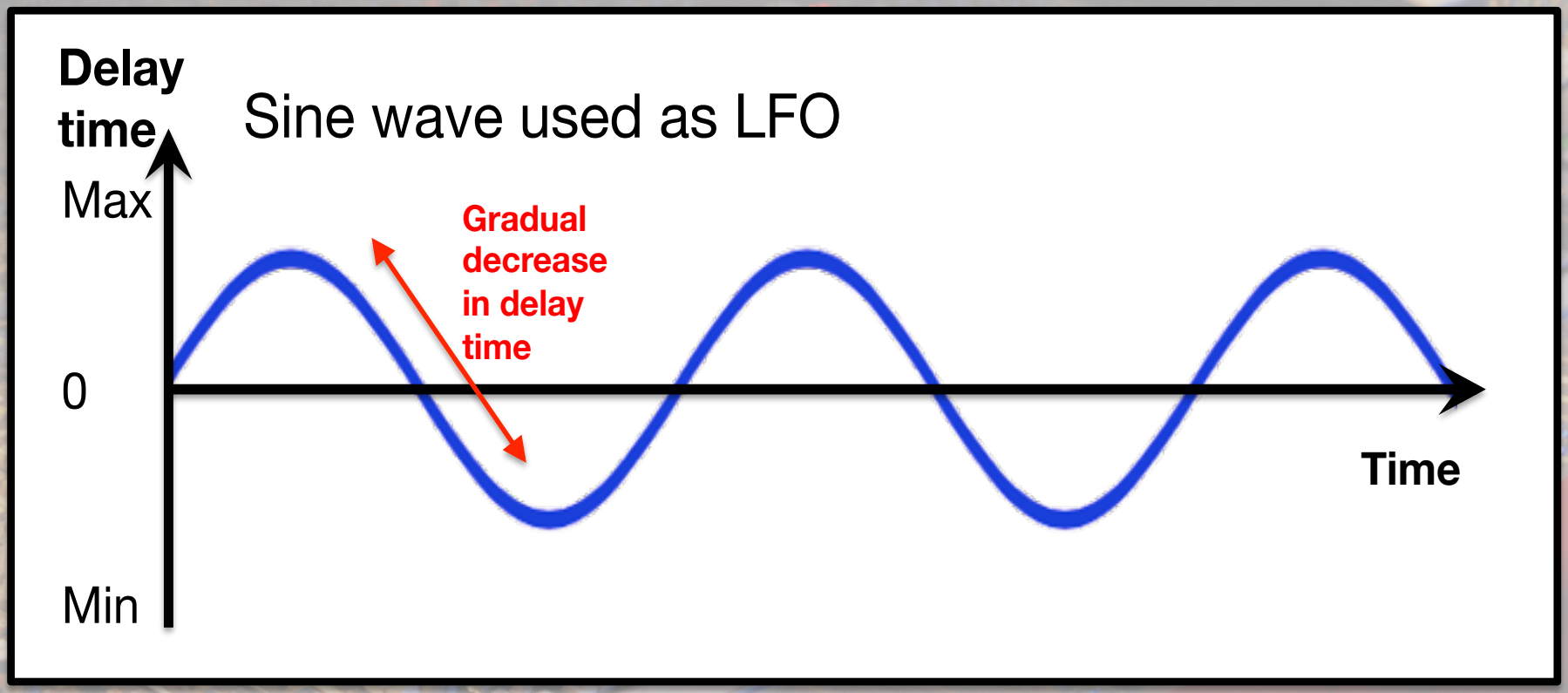
9. Modulation Effects

Boss Chorus / Phaser / Flanger Pedals

Using LFOs

- An LFO is a **low frequency oscillator**
- The frequencies used are **below 20Hz,** so they are inaudible
- An LFO changes a parameter of an effect or processor **according to another wave**
- Examples might be **altering the delay time according to a sine wave**.
- Other geometric waves can be used to change the effect of an LFO (e.g. square/triangle/pulse)

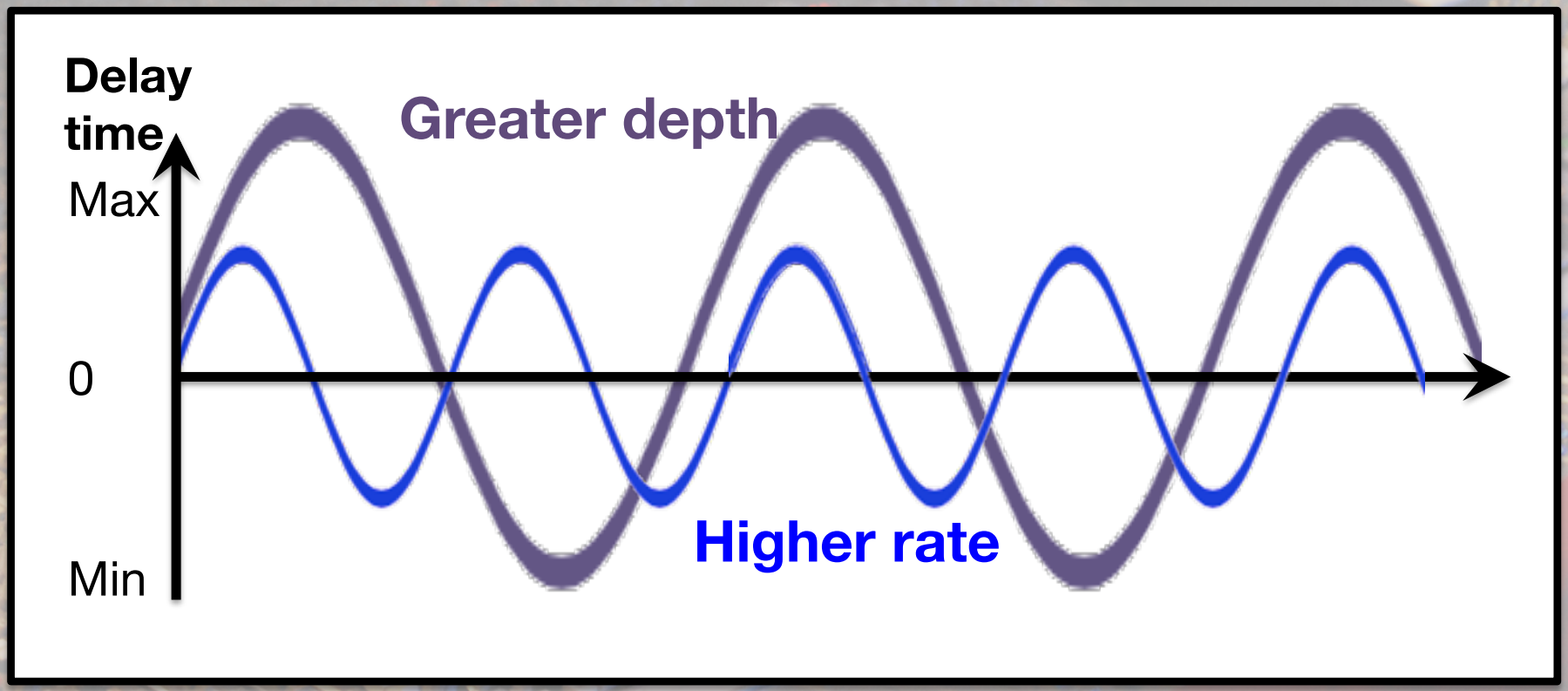
Using LFOs


Delay time
Sine wave used as LFO
Max
0
Min
Gradual decrease in delay time
Time

Controls on Modulation Effects

- Modulation effects have controls related to the **rate** and the **depth** of the modulation
- **Rate** is how fast the periodic change of the parameter takes place (wave **frequency**)
- **Depth** is how much the parameter is varied (wave **amplitude**)
- The combination of both of these parameters can change whether the effect sounds **subtle** or **very obvious**

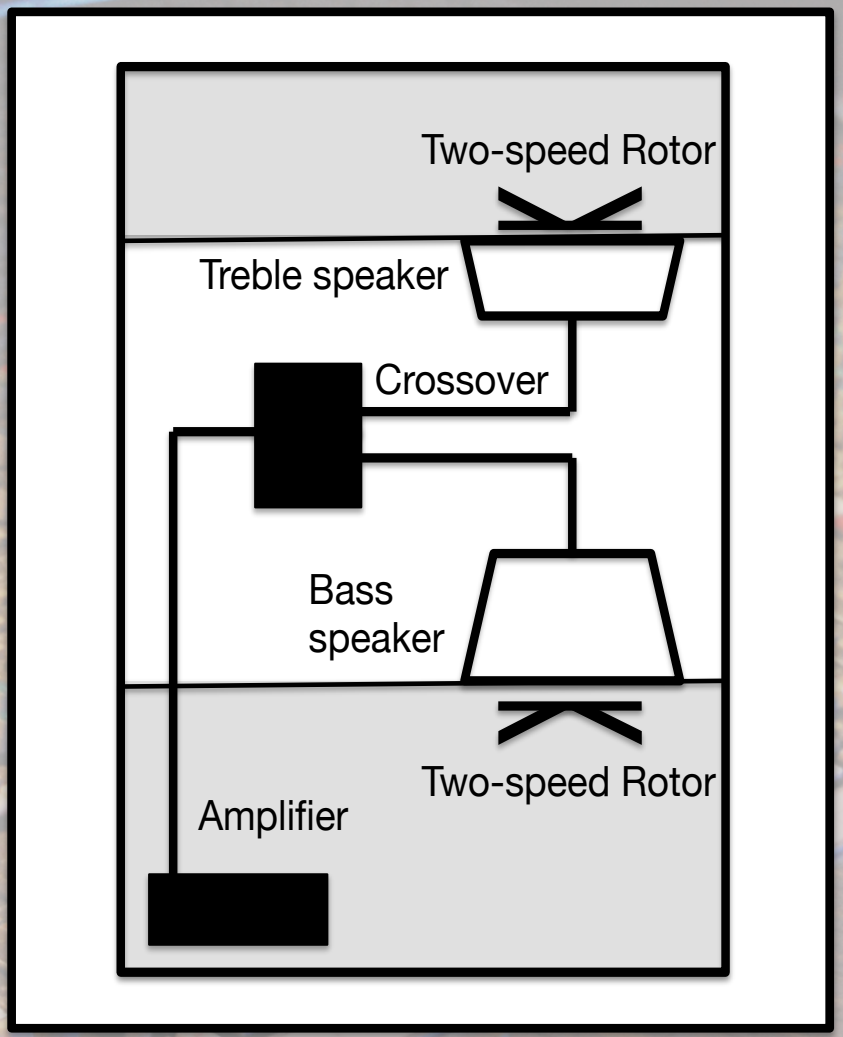
Controls on Modulation Effects



The Leslie Speaker

- The Leslie speaker uses the **Doppler Effect** to create modulation, and is sometimes called ‘Rotary’ on effect plugins.
- This is similar to the **changing pitch** heard when an ambulance passes you
- It is a system of **rotating speakers** used primarily with the Hammond Organ in the 1960s
- It occurs because the **source of a sound changes position, relative to the listener.**

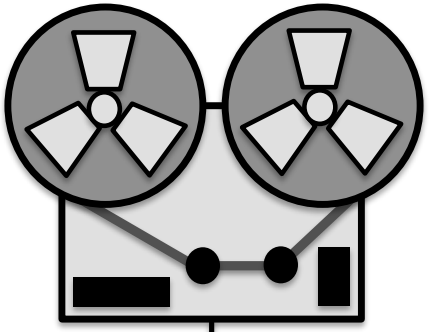
The Leslie Speaker

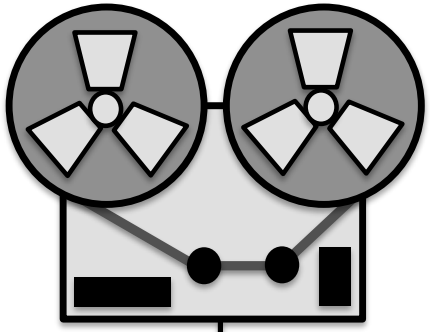


9. Modulation Effects

Tape

1. Same recording played on both tape machines





‘Dry signal

‘Wet’ signal

2. Hand pressure on the reel of one tape recorder causes a slight delay

Output

3. Combination of both signals gives an effect similar to a **flanger**